Scanning the Past

Michael I. Pupin

The first issue of the PROCEEDINGS OF THE INSTITUTE OF RADIO ENGINEERS (IRE) was published 80 years ago this month. Michael I. Pupin, a professor of electromechanics at Columbia University, authored the first paper in this first issue, a paper that discussed how to determine the radiation resistance of an antenna. A Serbian immigrant, Pupin already had achieved exceptional economic success as an inventor, and was the mentor of such pioneers in radio as Alfred N. Goldsmith and Edwin H. Armstrong.

In his paper, Pupin stated that there were two ways to determine radiation resistance: through the use of mathematical analysis or by experiment. He noted that it was "extremely difficult" to obtain a solution of the radiation law of a complex antenna using electromagnetic theory. As an alternative, he suggested an experimental method similar to that which he had used in measurements of alternating current circuits. His method employed a version of the Wheatstone Bridge, which he believed would give a fairly accurate value for radiation resistance if it was large compared to other resistances in the coupling circuit between the source and the antenna. Alfred Goldsmith commented that the Pupin paper provided a good example of the transfer of ideas from one field of research to another.

Pupin was born in 1858 in the small village of Idvor, which later became part of Yugoslavia. His early education was in Idvor and a nearby town, and he worked in summers as a herdsman. In 1873, he was sent to Prague to continue his education, but he left for America in 1874 soon after the death of his father. He arrived almost penniless and did farm work and then worked in a cracker factory while learning English and taking advantage of access to the Cooper Union Library in New York City. In 1879, Pupin enrolled at Columbia University, from which he graduated in 1883, becoming a U.S. citizen the same year.

Pupin received graduate fellowships that enabled him to study at Cambridge University in England and at the University of Berlin in Germany, where his teachers included Hermann von Helmholtz and Gustav Kirchhoff. He received his doctorate at Berlin in 1889 and then returned to Columbia, where he taught in the Electrical Engineering Department until his retirement in 1931. He did research on electrical power apparatus and X-ray tubes during the 1890s. In 1900 he obtained patents on loading coils for the improvement of telephone communication, and sold the U.S. rights to the American Telephone and Telegraph Co. for $455 000. He also sold the European rights to the invention to the German firm, Siemens and Halske. He received 34 patents in all, several of the later ones being in the field of radio.

Pupin was an active member of both the IRE and the American Institute of Electrical Engineers (AIEE), serving as President of the IRE in 1917 and as President of the AIEE in 1925. He received the Edison Medal of the AIEE in 1920 and the IRE Medal of Honor in 1924. His popular autobiography, *From Immigrant to Inventor*, received the Pulitzer Prize in 1924. He also wrote *The New Reformation* (1927) and *Romance of the Machine* (1930), as well as many technical papers. He died in New York City in 1935.

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